

CLAIMS

What is claimed is:

1. A process for flash spinning comprising
  - (a) forming a spin mixture that comprises a spin agent and a polymer mixture,
  - (b) pressurizing the spin mixture to a first pressure that is greater than the autogenous pressure thereof, and
  - (c) extruding the spin mixture through an aperture into a region at a pressure that is less than the autogenous pressure of the spin mixture, and at a temperature such that the spin agent vaporizes upon exposure to the region, to form a flash-spun structure;wherein the polymer mixture comprises 0 to 95 % by weight of a first polymer and 5 to 100 % by weight of a second polymer;  
wherein the first polymer is selected from the group consisting of polyolefins, copolymers thereof with ethylenically unsaturated monomers, polyesters, and mixtures thereof; and  
wherein the second polymer is selected from the group consisting of polyolefins, copolymers thereof with ethylenically unsaturated monomers, polyesters, and mixtures thereof, and the second polymer comprises 1 to 25 mol % of pendant functional groups.
2. The process of Claim 1 further comprising subjecting the pressurized spin mixture to a second pressure that is less than the first pressure but is greater than the autogenous pressure of the spin mixture prior to extruding the mixture into the region.
3. The process of Claim 1 or Claim 2 wherein forming the flash spun structure comprises forming a plexifilamentary yarn.
4. The process of Claim 1 or Claim 2 wherein forming the flash spun structure comprises forming a microcellular foam.

5. The process of Claim 1 or Claim 2 wherein the polymer mixture comprises 70 to 95 percent by weight of the first polymer and 30 to 5 percent by weight of the second polymer.

5        6. The process of Claim 1 or Claim 2 wherein the first polymer is polyethylene terephthalate.

7. The process of Claim 1 or Claim 2 wherein the first polymer is polyethylene.

8. The process of Claim 1 or Claim 2 wherein the  
10 second polymer is polyethylene terephthalate.

9. The process of Claim 1 or Claim 2 wherein the second polymer is polyethylene.

10. The process of Claim 1 or Claim 2 wherein the pendant group is a fluoro-olefin radical.

15        11. The process of Claim 8 wherein the second polymer is polyethylene terephthalate grafted with fluoro-olefin radical.

12. The process of Claim 9 wherein the second  
20 polymer is polyethylene grafted with fluoro-olefin radical.

13. The process of Claim 1 or Claim 2 wherein the pendant group is oxyethylene trimer.

14. The process of Claim 8 wherein the second  
25 polymer is polyethylene terephthalate grafted with oxyethylene trimer.

15. The process of Claim 9 wherein the second polymer is polyethylene grafted oxyethylene trimer.

16. The process of Claim 1 or Claim 2 wherein the pendant group is a perfluorovinyl ether.

30        17. The process of Claim 8 wherein the second polymer is polyethylene terephthalate grafted with perfluorovinyl ether.

18. The process of Claim 9 wherein the second polymer is polyethylene grafted perfluorovinyl ether.

35        19. The process of Claim 1 or Claim 2 wherein the pendant group is a vinyl silane.

20. The process of Claim 8 wherein the second polymer is polyethylene terephthalate grafted with vinyl silane.

21. The process of Claim 9 wherein the second  
5 polymer is polyethylene grafted vinyl silane.

22. The process of Claim 1 or Claim 2 further comprising adjusting the first pressure to an amount that is greater than the cloud point pressure of any individual polymer in the spin mixture.

10 23. The process of Claim 1 or Claim 2 further comprising heating the flash-spun structure thereby formed to a temperature of at least 100°C.

24. The process of Claim 3 further comprising heating the plexifilimentary yarn thereby formed to a  
15 temperature of at least 100°C.

25. A process for flash spinning comprising

- (a) forming a spin mixture that comprises a spin agent selected from the group consisting of aliphatic hydrocarbons,  
20 fluorocarbons, halogenated hydrocarbons, and hydrofluorocarbons, and a polymer mixture,
- (b) pressurizing the spin mixture to a first pressure that is greater than the  
25 autogenous pressure thereof,
- (c) subjecting the pressurized spin mixture to a second pressure that is less than the first pressure but is greater than the autogenous pressure of the spin mixture,  
30 and
- (d) extruding the spin mixture through an aperture into a region at a third pressure that is less than the autogenous pressure of the spin mixture, and at a temperature  
35 such that the spin agent vaporizes upon exposure to the region, to form a flash-spun structure;

wherein the polymer mixture comprises 70 to 95 percent by weight of a first polymer and 5 to 30 percent by weight of a second polymer;

5 wherein the first polymer is polyethylene or polyethylene terephthalate; and

wherein the second polymer is polyethylene or polyethylene terephthalate, and the second polymer comprises 5 to 15 mol % of pendant fluorocarbon radicals or oxyethylene radicals.

10 26. The process of Claim 25 wherein the second polymer is grafted with 5 to 15 mol % fluorocarbon radicals.

27. The process of Claim 25 wherein the second polymer is grafted with 5 to 15 mol % oxyethylene radicals.  
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28. The process of Claim 25 further comprising heating the flash-spun structure thereby formed to a temperature of at least 100°C.

29. A spin mixture comprising a spin agent and a  
20 polymer mixture comprising 0 to 95 % by weight of polyethylene or polyethylene terephthalate and 5 to 100% by weight of a functional polymer the functional polymer being polyethylene or polyethylene terephthalate having 1 to 25 mol % of pendant  
25 functional groups selected from the group consisting of fluorocarbon radicals and oxyethylene radicals.

30. A spin mixture comprising a spin agent and a polymer mixture,

30 wherein the polymer mixture comprises 0 to 95 % by weight of a first polymer and 5 to 100 % by weight of a second polymer;

35 wherein the first polymer is selected from the group consisting of polyolefins, copolymers thereof with ethylenically unsaturated monomers, polyesters, and mixtures thereof; and

wherein the second polymer is selected from the group consisting of polyolefins, copolymers thereof

with ethylenically unsaturated monomers, polyesters, and mixtures thereof, and the second polymer comprises 1 to 25 mol % of pendant functional groups.

5       31. The spin mixture of Claim 30 wherein the spin agent is selected from the group consisting of aliphatic hydrocarbons, fluorocarbons, halogenated hydrocarbons, and hydrofluorocarbons

      32. The spin mixture of Claim 30 wherein the polymer mixture comprises 70 to 95 percent by weight of  
10      the first polymer and 30 to 5 percent by weight of the second polymer.

      33. The spin mixture of Claim 30 wherein the first polymer is polyethylene terephthalate.

15       34. The spin mixture of Claim 30 wherein the first polymer is polyethylene.

      35. The spin mixture of Claim 30 wherein the second polymer is polyethylene terephthalate.

      36. The spin mixture of Claim 30 wherein the second polymer is polyethylene.

20       37. The spin mixture of Claim 30 wherein the pendant group is a fluoro-olefin radical.

      38. The spin mixture of Claim 30 wherein the second polymer is grafted with fluoro-olefin radical.

25       39. The spin mixture of Claim 30 wherein the pendant group is oxyethylene trimer.

      40. The spin mixture of Claim 30 wherein the second polymer is grafted with oxyethylene trimer.

      41. The spin mixture of Claim 30 wherein the pendant group is a perfluorovinyl ether.

30       42. The spin mixture of Claim 30 wherein the second polymer is grafted with perfluorovinyl ether.

      43. The spin mixture of Claim 30 wherein the pendant group is a vinyl silane.

35       44. The spin mixture of Claim 30 wherein the second polymer is grafted with vinyl silane.

45. The spin mixture of Claim 30 wherein the second polymer comprises 5 to 15 mol % of pendant functional groups.

5 46. The spin mixture of Claim 30 formed as a plexifilamentary yarn.

47. The spin mixture of Claim 30 formed as a microcellular foam.

48. The spin mixture of Claim 30 formed as a non-woven fabric.

10 49. The plexifilamentary yarn of Claim 46 formed as a non-woven fabric.